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Beane

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(54) **METHOD AND APPARATUS FOR AN EXERCISE SUPPORT DEVICE**

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(51) **Int. Cl.**

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A63B 22/02	(2006.01)
A63B 22/06	(2006.01)
A63B 71/00	(2006.01)
A61H 23/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A63B 69/0064*** (2013.01); *A61H 23/00* (2013.01); *A63B 22/02* (2013.01); *A63B 22/0664* (2013.01); *A63B 71/0009* (2013.01); *A63B 2209/10* (2013.01); *A63B 2210/50* (2013.01); *A63B 2225/09* (2013.01); *A63B 2225/64* (2013.01); *A63B 2225/66* (2013.01)

(58) **Field of Classification Search**

CPC A63B 21/1419; A63B 69/0064; A63B 71/0009; A63B 3/00; A61H 3/008; A61H 2201/165–2201/1652

USPC 482/69

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,881,492	A	11/1989	Jones	
5,137,272	A *	8/1992	Wilkinson	482/124
5,158,510	A	10/1992	Lemire	
5,176,597	A	1/1993	Bryne	
5,704,880	A	1/1998	Amatulle	
5,919,119	A	7/1999	Bohmer	
6,059,696	A	5/2000	Bohmer	
6,264,584	B1	7/2001	Bass	
6,575,876	B1	6/2003	Phelps-McMillon	
6,802,326	B2	10/2004	Kusama	
6,899,660	B1 *	5/2005	Chin et al.	482/66
7,066,181	B2	6/2006	West	
7,297,090	B2 *	11/2007	Torres	482/74
7,614,991	B2	11/2009	Fox	
7,618,355	B1 *	11/2009	Murdock	A63B 21/1419 482/110
8,043,197	B2 *	10/2011	Hetrick	482/91
8,257,232	B2	9/2012	Albert	
2008/0070757	A1 *	3/2008	Albert	A63B 69/0064 482/54
2009/0255531	A1	10/2009	Johnson	
2010/0170546	A1 *	7/2010	Popovic et al.	135/67
2010/0326366	A1 *	12/2010	Park	119/700

* cited by examiner

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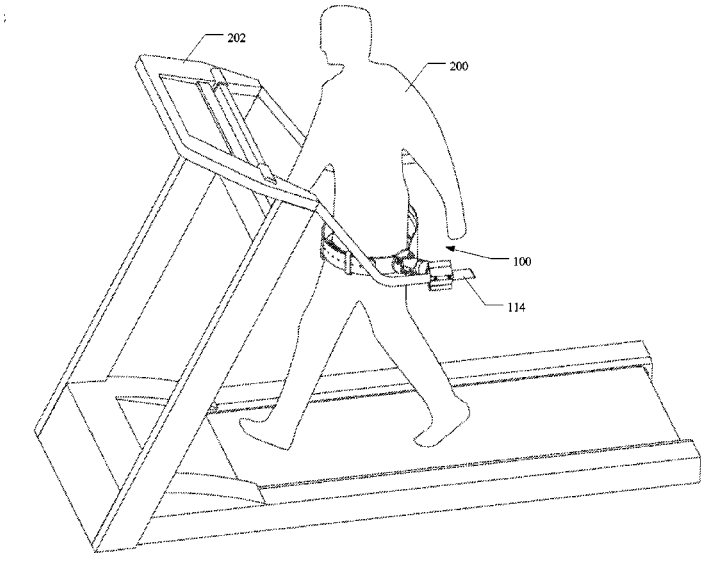
(57) **ABSTRACT**

Apparatuses and methods that assist a user in utilizing an exercise machine. An exercise support device enables a user to exercise without having to hold on to the exercise machine while exercising. The exercise support device has a belt that can be worn by a user. In embodiments, the belt is connected to arm assemblies, which can be coupled to the side rails of an exercise machine. The exercise support device provides balance for a user of an exercise machine, which can enhance the quality of a user's exercise.

18 Claims, 6 Drawing Sheets



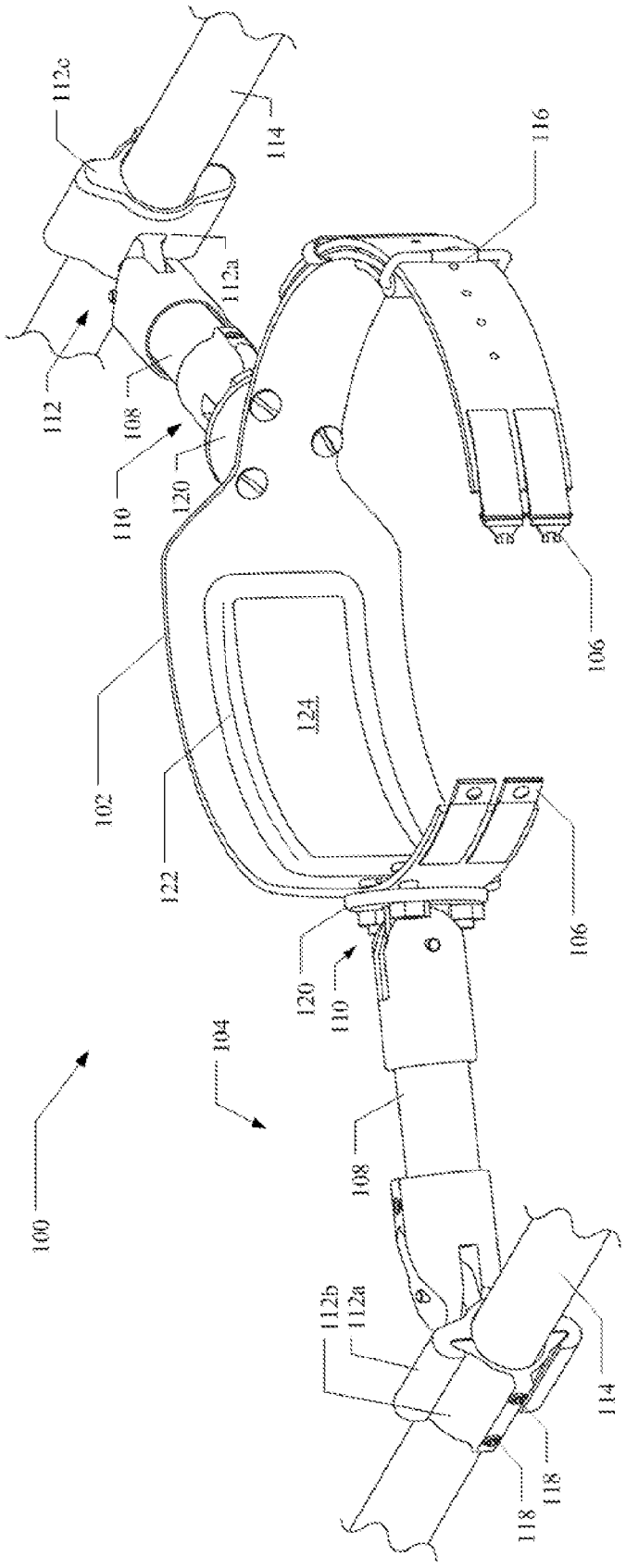

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FIG. 1

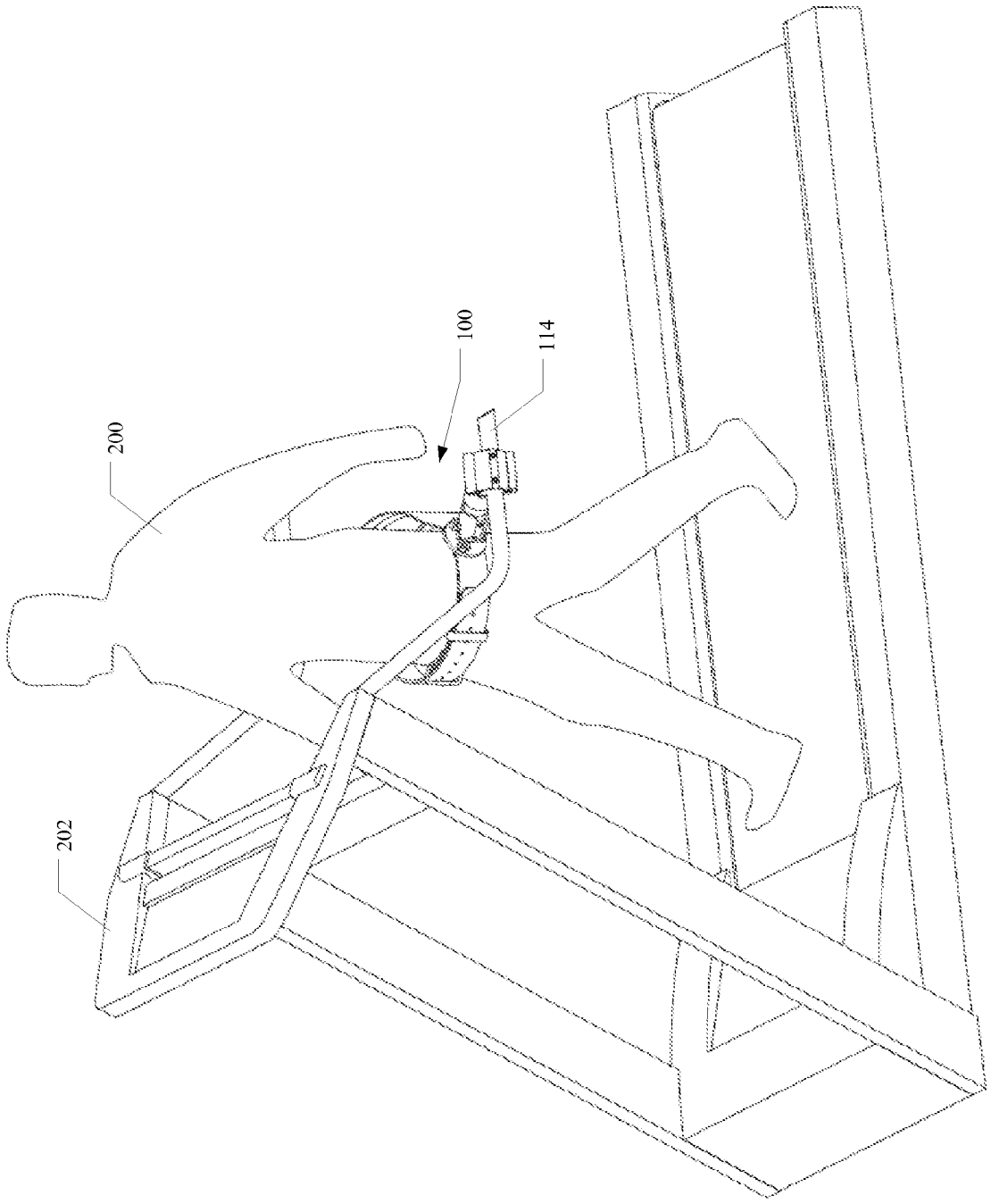

FIG. 2

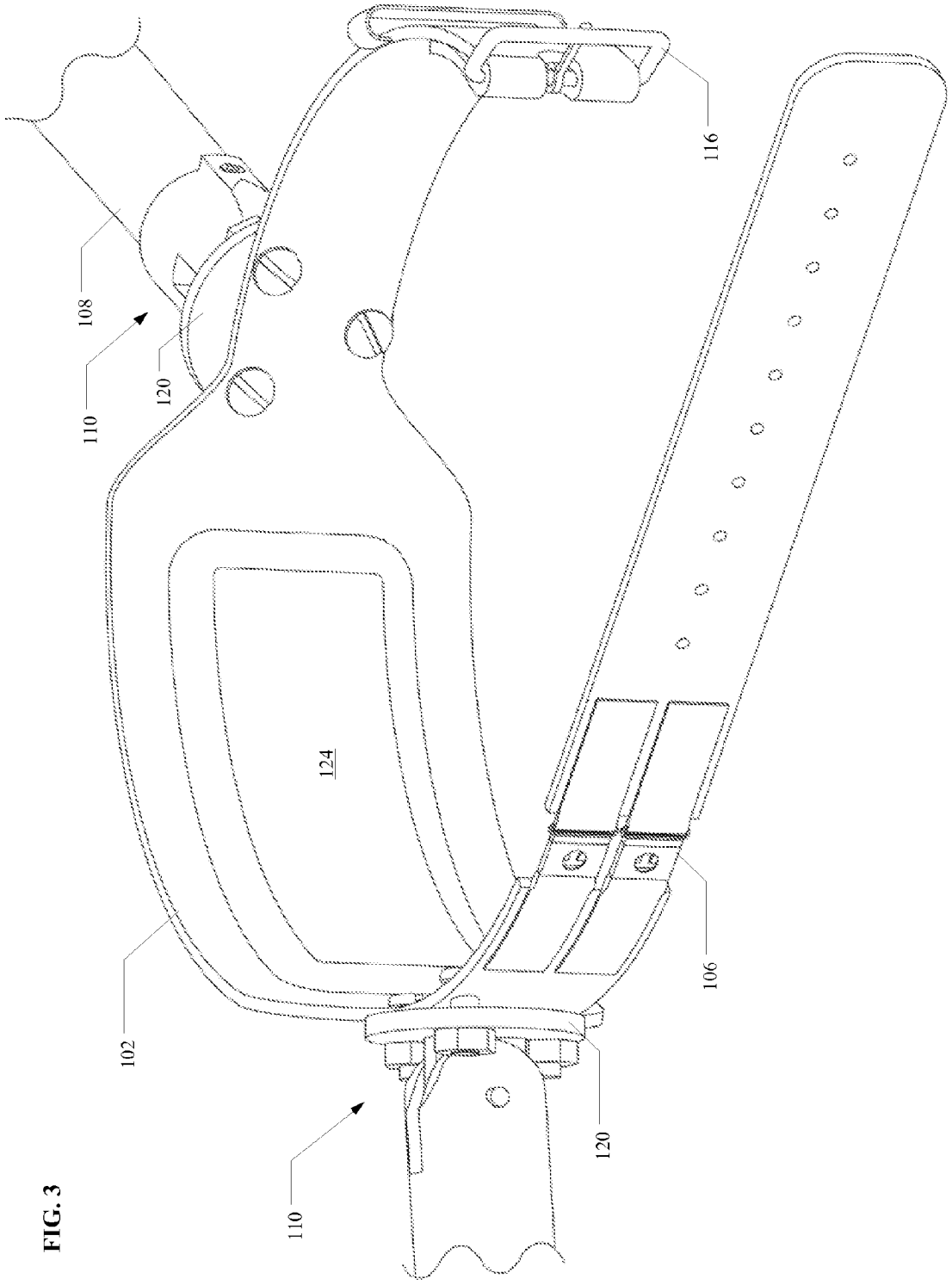

FIG. 3

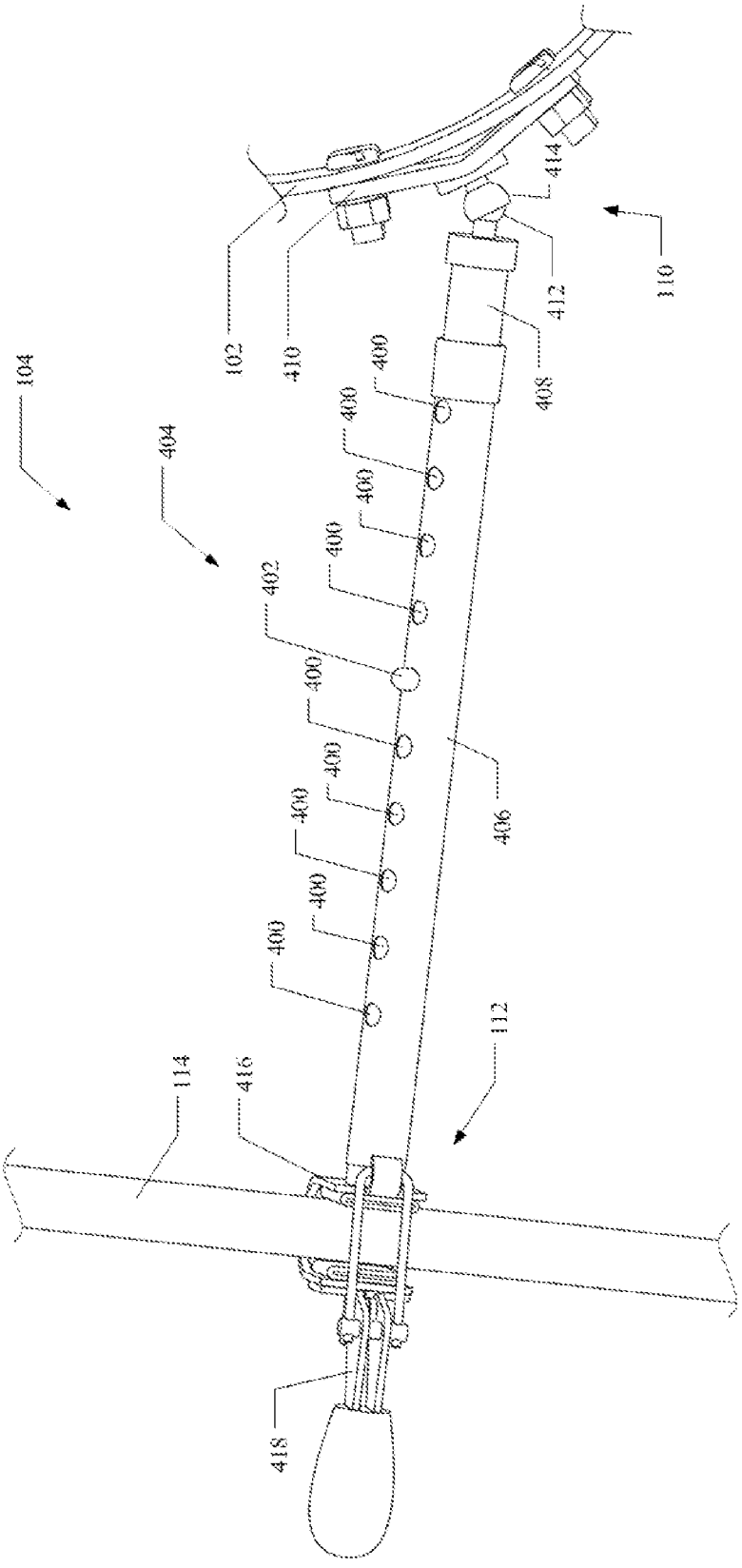

FIG. 4

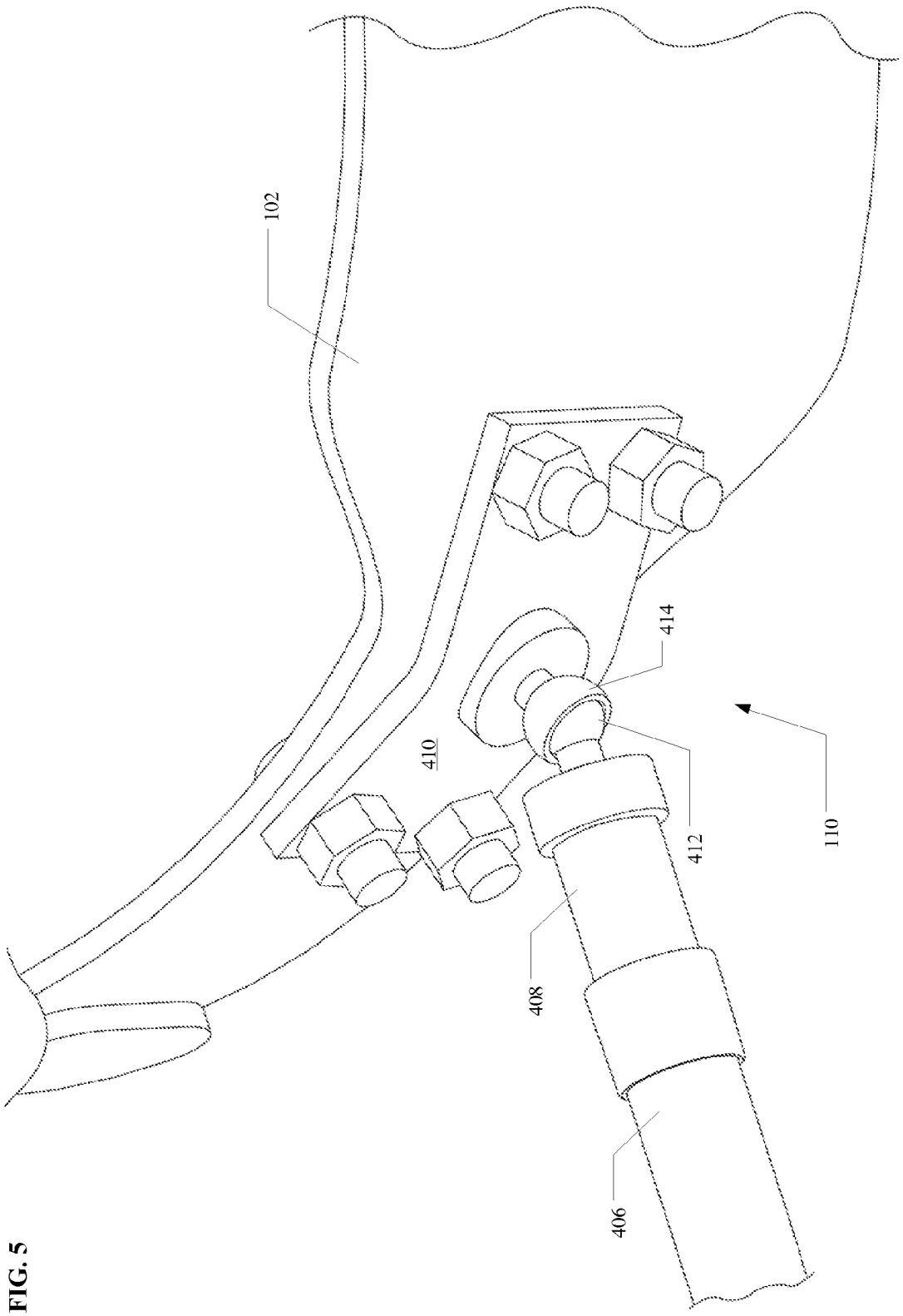

FIG. 5

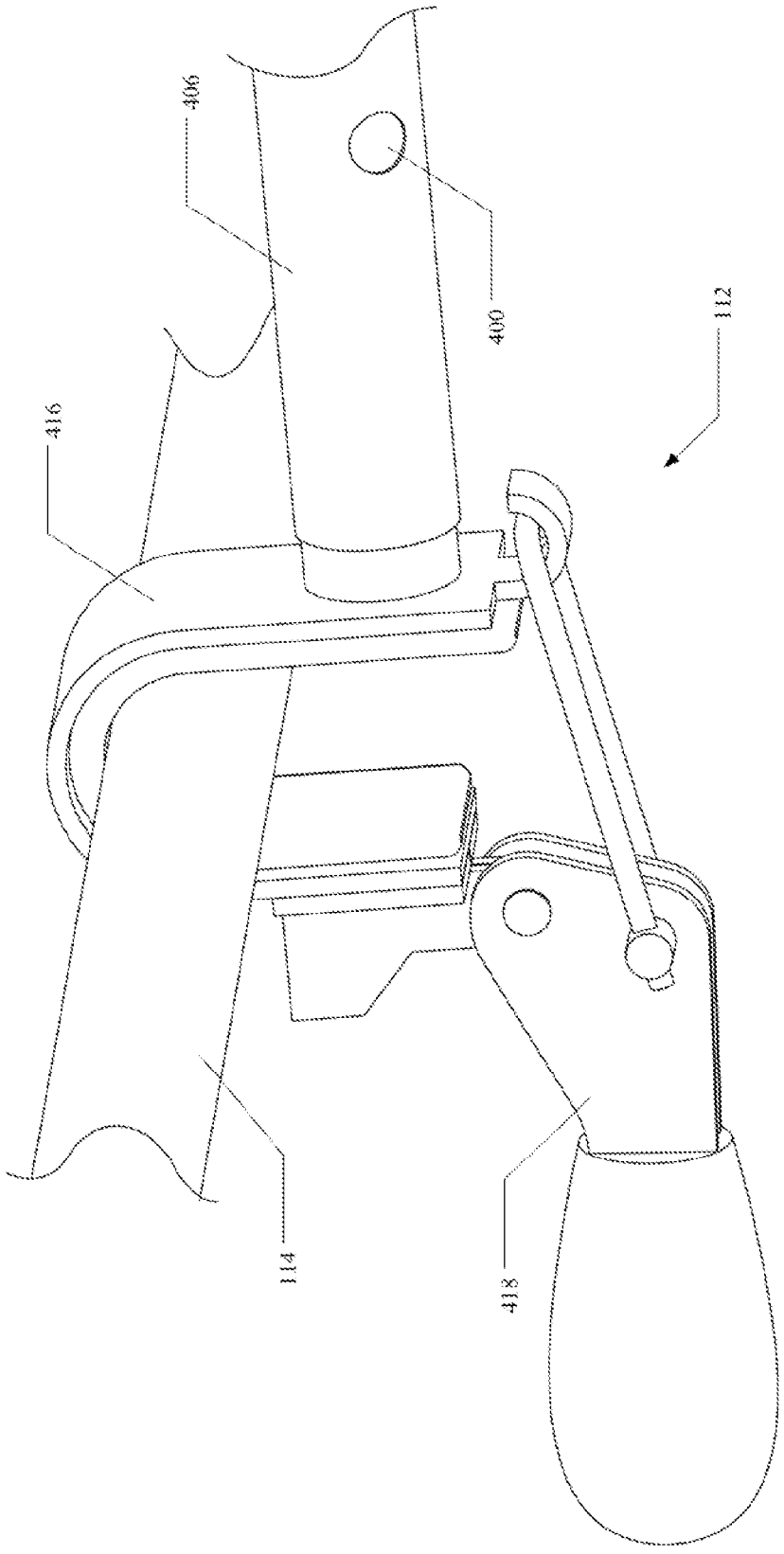

FIG. 6

METHOD AND APPARATUS FOR AN EXERCISE SUPPORT DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of the filing date of U.S. provisional patent application Ser. No. 61/845,387, filed on Jul. 12, 2013, entitled "Method and Apparatus for an Exercise Support Device," the disclosure of which is incorporated herein by reference.

BACKGROUND

Generally, exercise machines, including but not limited to treadmills, stair steppers, and elliptical trainers, permit a user to exercise within a small, predetermined space and in a controlled manner. These devices allow a user to exercise indoors and have a number of benefits, including eliminating the effects of adverse weather conditions, allowing users to modify resistance and incline for more rigorous training, enhancing user privacy and security, and avoiding the impact of exercising on pavement, which many people find to be difficult on knees and other joints. However, exercise machines may prove difficult to use, particularly for individuals recovering from surgery, or for those with conditions that affect balance and motor control. Many exercise machines increase the risk of falling; for example, individuals with neurodegenerative diseases, such as Machado-Josephs disease, suffer from degraded muscle control and coordination and the movement of the machine exacerbates these issues. At the same time, exercise can be particularly beneficial for individuals with such physical conditions.

Many exercise machines incorporate side rails that allow a user to grip the machine for balance, reducing the likelihood that the user will fall. However, there is a temptation for a user to hold on to the side rails of the machine continually during exercise. Unfortunately, holding onto the side rails of an exercise machine during exercise is less beneficial than allowing the user's arms to move naturally during exercise. Typically, when holding on to the exercise machine users burn fewer calories, stress on various joints (e.g., hips, knees, and shoulders) is increased, and the body's balance is undermined while exercising. Unfortunately, many users need to hold on to one or more of the side rails of the exercise machine in order to maintain balance and stability to avoid injury.

BRIEF SUMMARY

The following presents a simplified summary in order to provide a basic understanding of some aspects of the claimed subject matter. This summary is not an extensive overview. It is not intended to either identify key or critical elements or to delineate the scope of the claimed subject matter. Its sole purpose is to present some concepts in a simplified form as a prelude to the more detailed description that is presented later.

The described apparatuses and methods assist users in safely utilizing exercise machines, including, but not limited to, treadmills. In embodiments, the support device includes a belt that can be attached to a user's torso, and two arm assemblies, each arm assembly connected to a side of the belt. In use, the user stands on the exercise machine with the belt in place on the user's torso and an arm assembly extending from each side of the user. Each of the arm assemblies can be attached to each one of the side or handrails that are typically provided with an exercise machine. In embodiments, the arm assemblies each include a rigid or semi-rigid arm, such that when the belt is positioned and the arm assemblies are attached to the belt and the exercise machine, the belt stabilizes the user on the exercise machine.

In an embodiment, an exercise support device comprises a belt capable of being sized for a user of the exercise machine, a first arm assembly connected to the belt, wherein the first arm assembly includes a first arm and is capable of being attached to a side rail of the exercise machine, and a second arm assembly connected to the belt, wherein the second arm assembly includes a second arm and is capable of being attached to a side rail of the exercise machine.

In other embodiments, an exercise support device comprises a belt capable of being sized for a user of the exercise machine and includes a breakaway mechanism that disengages the belt upon the application of a predetermined force, a first arm assembly connected to the belt, wherein the first arm assembly includes a first arm and is capable of being attached to a side rail of the exercise machine, and a second arm assembly connected to the belt, wherein the second arm assembly includes a second arm and is capable of being attached to a side rail of the exercise machine.

To the accomplishment of the foregoing and related ends, certain illustrative aspects of the claimed subject matter are described herein in connection with the following description and the annexed drawings. These aspects are indicative of various ways in which the subject matter may be practiced, all of which are intended to be within the scope of the claimed subject matter. Other advantages and novel features may become apparent from the following detailed description when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The systems, devices and methods may be better understood by referring to the following description in conjunction with the accompanying drawings, in which like numerals indicate like structural elements and features in various figures. The components in the figures are not necessarily to scale, and simply illustrate the principles of the systems, devices and methods. The accompanying drawings illustrate only possible embodiments of the systems, devices and methods and are therefore not to be considered limiting in scope.

FIG. **1** depicts an embodiment of an exercise support device with the breakaway mechanism disengaged.

FIG. **2** depicts an embodiment of an exercise support device in use.

FIG. **3** depicts an embodiment of a belt of an exercise support device with the breakaway mechanism engaged.

FIG. **4** depicts an embodiment of an arm assembly of an exercise support device.

FIG. **5** depicts an embodiment of a belt connector of an exercise support device.

FIG. **6** depicts an embodiment of a rail connector of an exercise support device.

DETAILED DESCRIPTION

Aspects of the system and methods are described below with reference to illustrative embodiments. The references to illustrative embodiments below are not made to limit the scope of the claimed subject matter. Instead, illustrative embodiments are used to aid in the description of various aspects of the systems and methods. The description, made by way of example and reference to illustrative reference is not meant to being limiting as regards any aspect of the claimed subject matter.

Referring to FIG. **1**, an embodiment of an exercise support device **100** is illustrated. The exercise support device **100** assists a user **200** of an exercise machine **202**, enhancing their stability and allowing them to obtain the benefits of the exercise. FIG. **2** illustrates a user **200** utilizing another embodiment of an exercise support device **100** on an exercise machine **202**, shown here as a treadmill. Typical exercise machines **202** incorporate hand or side rails **114** that allow the user **200** to grip the machine **202** for stability. Such side rails **114** are typically parallel to the sagittal plane of the user **200** or the motion of the user **200** on the exercise machine **202**. They can be designed to be in easy reach for the user **200** to grasp. Many users **200** find the movement of an exercise machine **202** disconcerting, and falls or other accidents during use of exercise machines **202** are common due to muscle weakness or other medical condition. Furthermore, exercise machines **202** are often used in physical rehabilitation, where the controlled motion of the machines may be particularly beneficial, but the potential for a fall may be increased. Problems with balance or other physical issues can make it even harder for those users to comfortably and safely utilize such machines, particularly treadmills.

Users **200** tend to hold the side rail **114** of exercise machines **202** for security, which reduces the benefits and workout obtained from the use of the exercise machine **202**. When users **200** hold the side rails **114**, they do not get the same upper body workout as they would have moving their arms freely, and burn fewer calories. In addition, use of side rails **114** may throw off the gait and posture of the user **200**, particularly if the side rails **114** are not at an appropriate height for the individual user **200**. By holding on to the side rails **114** the user **200** may come to rely on that support, rather than working to improve their balance and practicing unsupported walking.

Referring again to FIG. **1**, the illustrated exercise support device **100** includes an adjustable belt **102** adapted to fit around the torso or waist of the user **200** of an exercise machine **202**. The belt **102** is connected to side rails **114** of an exercise machine **202** by two arm assemblies **104** that stabilize the user **200** on the exercise machine **202**, preventing the user **200** from straying too far from the appropriate position on the exercise machine **202**. The exercise support device **100** assists a user **200** in utilizing an exercise machine **202** without holding the hand or side rails **114** of the exercise machine **202**, enabling the user **200** to move more naturally. The arm assemblies **104** and the belt **102** limit the lateral and longitudinal movement of the user **200** in relation to the exercise machine **202**, providing stabilization and preventing the user **200** from falling. At the same time, the exercise support device **100** allows the user **200** to move their arms freely and obtain the full benefit of the exercise.

In an embodiment of the exercise support device **100**, the belt **102** includes a breakaway mechanism **106**. As shown, the belt **102** includes a discontinuity, and the breakaway mechanism **106** bridges the discontinuity to form a generally continuous belt **102** when fastened around the torso of the user **200**. Upon the application of a predetermined force, the breakaway mechanism **106** can release the user **200** from the belt **102**. For example, should a user **200** trip or fall, the sudden force of the fall would cause the breakaway mechanism **106** to release, freeing the user **200** from the belt **102**. This release prevents the user **200** from being held in place on the exercise machine **202** and potentially injured by the continued movement of the exercise machine **202** itself. In the embodiment shown in FIG. **2**, a sudden fall would cause the breakaway mechanism **106** and belt **102** to release the user **200**. This would allow the normal emergency stop features of the treadmill to engage, halting operation of the treadmill and avoid potentially suspending the user **200** on a moving treadmill. While shown on the front of the belt **102**, the breakaway mechanism **106** can be positioned on the side or back of the belt **102**, or anywhere that facilitates easy release from the belt **102**.

In one embodiment, the breakaway mechanism **106** is comprised of one or more clips that automatically release if a predetermined force is applied to the belt **102**. The breakaway mechanism **106** can also allow the user **200** to quickly free himself or herself of the exercise support device **100**. In embodiments, the release of the breakaway mechanism **106**, whether activated automatically or manually by the user **200**, triggers the emergency features of the exercise machine **202**. This can cause the exercise machine **202** to automatically stop when the breakaway mechanism **106** has been activated. In certain embodiments, the force required to release the breakaway mechanism **106** is greater than about 50 Newtons. In certain embodiments, the force required to release the breakaway mechanism **106** is greater than about 100 Newtons. In certain embodiments, the force required to release the breakaway mechanism **106** is greater than about 150 Newtons.

In embodiments, each arm assembly **104** includes a rigid or semi-rigid arm **108**, providing security to the user **200** of the exercise machine **202** during exercise. The arms **108** are sufficiently rigid or stiff to guide the user **200** and—through the belt **102**—assist in their balance on the exercise machine **202**. For example, if a user **200** were to veer toward their right side during use, the rigid arms **102** would prevent the belt **102** from moving outside of the desired operational area of the exercise machine **202**. Pressure exerted on the torso of the user **200** from the belt **102** would guide the user **200** to remain in that desired operational area. In embodiments, the arms **108** are extendable to accommodate users **200** of different heights and shapes, and to allow the exercise support device **100** to be used with a variety of exercise machine **202** designs.

In embodiments, the arms **108** are attached to the belt **102** via a belt connector **110**. The belt connectors **110** can take a variety of shapes, including but not limited to, a hinged joint and a flange **120** secured to the belt (as shown in FIG. **1**) or an angled bracket **410** (as shown in FIG. **4**). In an embodiment, the arms **108** are at least 6 inches in length. In another embodiment, the arms **108** are at least 8 inches in length. In yet another embodiment, the arms **108** are at least 12 inches in length.

The arms **108** can be connected to a side rail **114** of an exercise machine **202** via a rail connector **112**. As shown, the rail connector **112** can include a hinged joint. The rail connector **112** can take a variety of shapes to allow it to be securely attached to side rails **114** with different geometries, enabling use with a variety of types of exercise machines **202**. As used herein, "geometry" refers to shape and dimensions of a structure. For example, the support device **100** can include multiple sets of rail connectors **112** where the particular rail connector **112** can be selected and connected to the support device **100** based upon the geometry of the side rail **114** of a particular exercise machine **202**.

Securing the rail connector **112** to the side rails **114** provides support to the user **200**, and minimizes undesired lateral movement for users **200** who struggle with balance or otherwise have difficulty exercising on exercise machines **202**. In an embodiment, as illustrated in FIG. **1**, the rail connectors **112** are slip-on rail fittings. The slip-on fitting has a female portion **112***a* and a male portion **112***b* that are seated on either side of the side rail **114** and are slid together so that the female and male portions **112***a*, **112***b* engage. A stop **112***c* on one of the fitting pieces **112***a*, **112***b* prevents the two pieces **112***a*,

112*b* from sliding completely past each other. Set screws **118** can be threaded through apertures in each portion of the fitting and tightened to engage the fitting with the side rail **114**. Slip-on fittings can be obtained from Hollaender (Speed-Rail® line of fittings) or other manufacturers. Other suitable rail connectors **112** include, but are not limited to, collars, clamps, and brackets.

Referring to FIG. **3**, an embodiment of the belt **102** is illustrated. In one embodiment, the belt **102** may be secured and adjusted around the torso of a user **200** using a belt buckle **116** positioned on the front of the belt **102**. As shown, the belt **102** includes a plurality of apertures such that one or more prongs of the belt buckle **116** are inserted through the apertures to adjust the length of the belt **102** for the individual user **200**. In another embodiment, the belt **102** can be secured and adjusted by a hook-and-loop fastener. Any suitable method for adjusting belt length can be used, including, but not limited, to Velcro®.

In embodiments, the belt **102** is relatively wide, similar to a weight-lifting belt. Such width can provide greater support and increased stability for a user **200**. In one embodiment, the back side of the belt **102** includes a support **124** that stabilizes the lower back of the user **200**. In embodiments, the support **124** includes padding and increased belt width. The use of padding can provide a brace to relieve pressure from the back of the user **200**. The belt **102** and support **124** may be constructed out of a variety of materials, including but not limited to leather, plastics and canvas. In embodiments, the belt **102** can be made using relatively stiff materials such as leather to provide greater support and stability to the user **200**.

In embodiments, the back side of the belt **102** includes a pocket **122**, shown in FIG. **1**. In embodiments, the pocket **122** can secure an insert against the back of a user **200**. Such inserts include, but are not limited to, hot packs, cold packs, padding, and vibrating massage devices. In certain embodiments, the pocket **122** can be securely held shut with a closure. Suitable closures include, but are not limited to, hook and loop fasteners, buttons, snaps, and zippers.

As shown, the belt **102** can include a breakaway mechanism **106** that automatically releases when sufficient force is applied. This breakaway mechanism **106** can work in conjunction with an emergency stop mechanism of an exercise machine **202** to enhance user **200** safety. For example, many treadmills contain an emergency stop mechanism that includes one or more clips attached to the user **200** or the user's clothing and an emergency stop on the machine, which may be a clip, button, or other device located on the treadmill. The emergency stop and the clip or clips attached to the user **200** are connected by a string or wire that is stretched between the user **200** and the machine when the user **200** is in position on the treadmill. If the treadmill user **200** is too far away from the emergency stop button, the string or wire will go taut and activate the emergency stop and halt the treadmill belt. In embodiments of the support device **100**, if the user **200** falls, the breakaway mechanism **106** will release them from the belt **102**. The fall of the user **200** will trigger the emergency release mechanism of the treadmill, preventing the treadmill from continuing to move after the user **200** has fallen.

The arm assemblies **104** can be attached to the belt **102** in a variety of locations, in accordance with the design of the exercise machine **202** to be used. In one embodiment, the arm assemblies **104** are located at the left and right sides of the belt **102** to be conveniently attached to the side rails **114** of an exercise machine **202**. In embodiments, the arm assemblies **104** are detachable from the belt **102**. Detaching the arm assemblies **104** from the belt **102** can facilitate storage and transportation of the device **100** by the user **200**, shipment of the device **100** for distribution and retail purposes, as well as replacement of selected portions of the device **100**. In other embodiments, the rail connector **112**, arms **108**, and belt connectors **110** are each detachable and interchangeable. The interchanging can be accomplished with any suitable releasable fastener including, but not limited to, screws, bolts and hooks.

In another embodiment, the belt **102** includes a quick release device (not shown) such as a hook-and-loop fastener, which may be released by pulling apart the fastener. In yet another embodiment of the quick release device, the release device comprises a side-release buckle, which may be released by applying a force to the sides of the buckle to separate the buckle mechanism. This quick-release mechanism can allow the user **200** to remove the belt **102** quickly without requiring the user **200** to resize the belt **102** once it has been adjusted to their torso. In an embodiment, the quick release device and the breakaway mechanism **106** are combined into a single mechanism.

Referring to FIG. **4**, an embodiment of an arm assembly **104** is illustrated. In embodiments, the arm assembly **104** includes a belt connector **110** that allows for varying angles between the arm **108** and the belt **102**. This flexibility, in conjunction with the length adjustment of the arm **108**, allows the support device **100** to be used comfortably by individuals of varying heights and with a variety of exercise machines **202** with side rails **114**. For example, the torso of a tall user **200** may be several inches above the height of the side rails **114**. Accordingly, the belt **102** should sit on the torso of the user **200** several inches above the position of the rail connectors **112** on the side rails **114**. Flexibility in the belt connector **110**, allows for this height differential. As shown in FIG. **1**, the flexibility can be achieved through hinged joints. Flexibility in the belt **102** and/or rail connectors **112** also accommodates for motion in the gait of the user **200** while the rigid arms **108** provide security.

In one embodiment, the belt connector **110** includes a ball and socket joint. For example, the socket portion **414** of the joint can be attached to the belt **102** and the ball portion **412** to the arm **108**, allowing free rotation and varying angles between the arm **108** and belt **102**. The socket **414** portion of the ball and socket joint can be attached to the belt **102** using pins, studs or any other suitable method. Similarly, the ball portion **412** of the ball and socket joint can be attached to the arm **108** using screws, pins or any other suitable method. Of course, the socket and ball portions **414**, **412** of the joint could be reversed as well, attaching the ball portion **412** to the belt **102**, and the socket portion **414** to the arm **108**.

In embodiments, the arms **108** include an extension mechanism **404** for adjusting the length of the arms **108** to adapt to different sizes and heights of users **200** and exercise machines **202**. In an embodiment, the arm **108** comprises one or more nested tubes **406**, **408** and a pin mechanism that facilitates length adjustment. The tubes **406**, **408** can be made from lightweight and fairly rigid material including, but not limited to, an aluminum alloy or plastic. Use of a lightweight material reduces weight during exercise and facilitates transport the device, while the rigidity helps support the user **200** and assists in maintaining user **200** balance and position on the exercise machine **202**.

The pin mechanism can include a spring-loaded detent pin **402** that protrudes from the inner tube **408**, and a series of apertures **400** that extend along all or a portion of the outer tube **406**. This mechanism allows the user **200** to adjust the length of the arm **108** according to his or her needs and then lock the arm **108** length in place, such that the length of the arm **108** will be generally fixed and stable during exercise. In

embodiments, the detent pin **402** is inserted into one of the apertures **400** in the outer tube **406** and a spring mechanism holds the detent pin **402** in place within the aperture **400**. When a user **200** pushes on the detent pin **402**, the pressure will cause the pin **402** to disengage from the selected aperture **400**, allowing the nested tubes **406**, **408** to slide or telescope. This telescoping movement allows the length of the arm **108** to be adjusted. When the desired length is achieved, the detent pin **402** is seated in the closest available aperture **400** and the length of the arm **108** is once again locked in position.

Any other mechanism that allows for extension or adjustment of the arm **108** can be used to implement length adjustable arms **108** for use with the support device **100**. Other such mechanisms include, but are not limited to, nested tubes with a tube clamp such as is described in U.S. Pat. No. 4,596,484 (Lock for telescoping tubular support), or U.S. Pat. No. 144, 997 (Improvement in hose-couplings); and internal locking mechanisms such as is described in U.S. Pat. No. 4,419,026 (Internal locking device for telescopic elements and method of making the same) or U.S. Pat. No. 1,115,057 (Expansible core).

Turning now to FIG. **5**, an embodiment of the belt connector **110** is illustrated. As shown, the belt connector **110** includes an angled bracket **410**, secured to the belt **102** by one or more bolts, screws or other fasteners. The angled bracket **410** can provide stability to the connection of the arm assembly **104** to the belt **102**, facilitating stabilization of the user **200** and increasing durability of the support device **100**. Connected to the angled bracket **410** is the ball and socket joint, **412**, **414**, which gives flexibility to the support device **100**, allowing for users **200** and exercise machines **202** of different heights. This flexibility also allows the support device **100** to move with the user **200** during exercise, giving some flexibility, while the rigid arm stabilizes the belt **102**.

Referring to FIG. **6**, an embodiment of a rail connector **112** is illustrated. In embodiments, the rail connector **112** includes a clamp that connects the arm assembly **104** to the side rails **114** of the exercise machine. In embodiments, the rail connector **112** fastens to the side rails of the exercise machine **202**, securing the user **200** to the exercise machine **202** via the support device **100** while enabling the user **200** to exercise without holding on to the exercise machine **202**. In embodiments, the rail connector **112** engages the side rail **114** so that it is generally fixed in position relative to the side rail **114** during exercise. Fixing the rail connectors **112** with respect to the side rails **114** stabilizes the support device **100** giving greater security to the user **200**.

As shown in FIGS. **4** and **6**, in an embodiment, the rail connector **112** is a U-shaped bracket **416** that can be engaged around a side rail **114** and a pull-action toggle clamp **418** can be used to close off the open end of the U-shaped bracket **416** and secure the rail connector **112** to the side rail **114**. The interior of the U-shaped bracket **416** can be coated in rubber or any other material that enables the U-shaped bracket **416** to grip the side rails **114** and maintain a generally fixed position relative to the side rails **114**. In further embodiments, the rail connectors **112** can be made in a variety of different shapes and dimensions to fasten to the side rails **114** of multiple types of exercise machine **202**. In other embodiments, the rail connector **112** can also include ball and socket joint or other pivotable mechanisms, such as a hinge, length of cord, or strap. The pivotable mechanisms allow flexibility in the support device **100** and, as with the belt connector **110**, allow for difference in height between the belt **102** and the side rails **114**. As with the belt connector **110**, in an embodiment with a ball and socket joint, the ball portion **412** of the joint could be attached to the arm **108**, and the socket portion **414** of the joint to the rail connector **112**. Of course, the socket and ball portions **414**, **412** of the joint could be reversed as well, attaching the ball portion **412** to the rail connector **112**, and the socket portion **414** to the arm **108**. Flexible joints between the belt connectors **110**, the arms **106**, allow the arms **108** to be folded flat against the belt **102** for easier transportation and storage of the support device **100**.

In embodiments, to utilize the exercise support device **100**, the user **200** can secure the rail connectors **112** to side rails **114** of an exercise machine **202**, and connect the arm assemblies **104** to the belt **102** by way of the belt connectors **110**. A user **200** may put on the belt **102** by wrapping the belt around his or her waist and buckling the belt **102**. The user **200** can adjust the length of the arms **108** as appropriate for the proper use of the exercise machine **202** and comfort of the user **200**. The user **200** can use the exercise machine **202** by walking, running, using an elliptical trainer, using a stair stepping machine, or other method of exercise on an exercise machine **202**.

In other embodiments, the user **200** can select the appropriate rail connectors **114** to attach to the side rails **112** of the desired exercise machine **202** and connect the selected rail connectors **112** to the arms **108**, replacing an existing set of rail connectors **112** as needed.

What has been described above includes examples of aspects of the claimed subject matter. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the claimed subject matter, but one of ordinary skill in the art may recognize that many further combinations and permutations of the disclosed subject matter are possible. Accordingly, the disclosed subject matter is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the terms "includes," "has" or "having" or variations in form thereof are used in either the detailed description or the claims, such terms are intended to be inclusive in a manner similar to the term "comprising" as "comprising" is interpreted when employed as a transitional word in a claim.

What is claimed is:

1. An exercise support device configured for use with an exercise machine, the exercise support device comprising:

an adjustable belt that can be sized for a user of the exercise machine, wherein the exercise machine is selected from the group consisting of a treadmill, a stair-stepper, and an elliptical machine;

a first arm assembly that connects the adjustable belt to a first side rail of the exercise machine when the exercise support device is installed on the exercise machine; and

a second arm assembly that connects the adjustable belt to a second side rail of the exercise machine when the exercise support device is installed on the exercise machine,

wherein at least a portion of each of the first arm assembly and second arm assembly are substantially rigid and are configured to extend transversely in a gap between the adjustable belt and the first and second side rails to assist the user in maintaining stability when the exercise support device is installed on the exercise machine;

wherein the first arm assembly comprises

a first belt connector attached to the belt,

a first arm attached to the first belt connector, wherein the first arm is substantially rigid, and

a first rail connector attached to the first arm: and

wherein the second arm assembly comprises:

a second belt connector attached to the belt,

a second arm attached to the second belt connector, wherein the second arm is substantially rigid, and

a second rail connector attached to the second arm; and

wherein the first rail connector is configured to connect to the first side rail and the second rail connector is configured to connect to the second side rail of the exercise machine.

2. The exercise support device of claim **1**, wherein the first and second rail connectors are reversibly detachable from the first and second arms, respectively.

3. The exercise support device of claim **2**, further comprising one or more customized rail connectors specific to a geometry of the first and second side rail, wherein the first and second rail connectors are replaceable with the one or more customized rail connectors.

4. The exercise support device of claim **1**, wherein the first and second belt connectors are reversibly detachable from the first and second arms, respectively.

5. The exercise support device of claim **1**, wherein the first and second rail connectors are fittings configured to secure to the first and second side rail, respectively, with fasteners.

6. The exercise support device of claim **1**, wherein the first and second rail connectors are clamps that are configured to hold in a pressure fit engagement with the first and second side rails, respectively, when the support device is connected to the exercise machine.

7. The exercise support device of claim **1**, wherein the first arm and the second arm each include an extension mechanism that controls a length of the first arm and the second arm.

8. The exercise support device of claim **7**, wherein

the first arm and the second arm each comprise an outer arm and an inner arm nested within the outer arm;

the outer arm includes a plurality of apertures spaced longitudinally along the outer arm, and

the extension mechanism comprises a spring-loaded detent pin mounted in the inner arm, which when aligned with a selected aperture from the plurality of apertures, protrudes from the selected aperture and substantially secures the length of the first arm and the second arm.

9. The exercise support device of claim **1**, wherein the first and second rail connectors each include a ball and socket joint.

10. The exercise support device of claim **1**, wherein the first and second belt connectors each include a ball and socket joint.

11. The exercise support device of claim **1**, further comprising:

a discontinuity in the adjustable belt; and

a breakaway mechanism connecting the adjustable belt across the discontinuity, wherein the breakaway mechanism is configured to disengage upon application of a predetermined force to the adjustable belt, causing the adjustable belt to open, and freeing the user from the adjustable belt and the exercise support device.

12. The exercise support device of claim **11**, wherein the predetermined force is greater than 50 Newtons.

13. The exercise support device of claim **1**, wherein the adjustable belt comprises a support element that comprises a layer of padding.

14. The exercise support device of claim **1**, wherein the adjustable belt comprises a support element that comprises a stiff brace for enhancing stability of the user.

15. The exercise support device of claim **1**, wherein the adjustable belt comprises a pocket located on an interior of the belt, sized and shaped to hold a removable insert.

16. An exercise support device configured for use with an exercise machine, the exercise support device comprising:

a belt that can be sized for a user of the exercise machine, wherein the exercise machine is selected from the group consisting of a treadmill, a stair-stepper, and an elliptical machine: a first arm assembly that includes:

a first belt connector attached to the belt,

a first arm that is substantially rigid and attached to the first belt connector, and

a first rail connector attached to the first arm, wherein the first rail connector is configured to attach to a first side rail of the exercise machine and the first arm is configured to extend transversely between the belt and the first side rail when installed; and

a second arm assembly that includes:

a second belt connector attached to the belt,

a second arm that is substantially rigid and attached to the second belt connector, and

a second rail connector attached to the second arm, wherein the second rail connector is configured to attach to a second side rail of the exercise machine and the second arm is configured to extend transversely between the belt and the second side rail when installed.

17. A method of using an exercise support device with an exercise machine, the method comprising the steps:

providing an exercise support device comprising:

a belt that can be sized for a user of the exercise machine wherein the exercise machine is selected from the group consisting of a treadmill a stair-stepper, and an elliptical machine:

a first arm assembly that includes

a first belt connector attached to the belt,

a first arm attached to the first belt connector, wherein the first arm is substantially rigid, and

a first rail connector attached to the first arm, wherein the first rail connector attaches to a first side rail of the exercise machine; and

a second arm assembly that includes

a second belt connector attached to the belt,

a second arm attached to the second belt connector, wherein the second arm is substantially rigid, and

a second rail connector attached to the second arm, wherein the second rail connector attaches to a second side rail of the exercise machine; attaching the first rail connector to the first side rail of the exercise machine, wherein the first arm extends transversely in a gap between the belt and the first side rail;

attaching the second rail connector to the second side rail of the exercise machine, wherein the second arm extends transversely in the gap between the belt and the second side rail;

securing the belt about the waist of the user;

adjusting a length of the first arm;

adjusting a length of the second arm; and

using the exercise machine.

18. The method of using an exercise support device with an exercise machine of claim **17**, further comprising the steps:

detaching the first rail connector from the first arm; detaching the second rail connector from the second arm;

selecting a different first rail connector based at least in part on a geometry of the first side rail;

selecting a different second rail connector based at least in part on a geometry of second side rail;

attaching the different first rail connector to the first arm; and attaching the different second rail connector to the second arm.

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